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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/829,447 | 04/22/2004 | Michael J. Thermos | 57779.000004 | 6328 |

7590 07/12/2005

HUNTON & WILLIAMS
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| EXAMINER | |
|---|---|
| NGUYEN, DINH Q | |
| **ART UNIT** | **PAPER NUMBER** |
| 3752 | |

DATE MAILED: 07/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/829,447 | THERMOS, MICHAEL J. | |
| | Examiner | Art Unit | |
| | Dinh Q. Nguyen | 3752 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *22 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1 and 3-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vaznaian et al (US 4,827,888) in view of Tice (US 1,166,560) and Lorraine (US 5,531, 202).

Vaznaian et al disclose an injection nozzle for injecting a nitrous oxide/fuel mixture to a combustion chamber (col. 1, lines 8-64). The nozzle comprises a body member (base member 19) having an inlet end and an outlet end; the body member defines an angular bore and a straight bore with the angular bore intersecting the straight bore (see figure 2). A tube (fuel line 13), concentric with the straight bore and in fluid communication with the straight bore inlet is provided which forms, in combination with the body member, an annular channel around the tube (see figure 2). Vaznaian et al disclose a preferred embodiment having an angled outlet but also teach other outlet configurations are usable (col. 3, lines 33-40). The reference is silent as to these configurations - applicant claims an outlet configuration wherein the tube is substantially flush with the outlet end of the body member and a plurality of spaced outlet ports are distributed around a central port. Tice (US 1,166,560), for example, discloses an annular passage about a center opening (page 1, lines 66-71, figure 2). Tice does not

disclose spaced ports; however, Lorraine suggests multiple passages leading to ports so as to impinge on the center stream in order to assist in forming fuel droplets (col. 2, lines 11-17). It would have been obvious at the time the invention was made to use an outlet such as disclosed by Tice as an alternative configuration recognized by Vaznaian et al. Furthermore, one would be motivated to replace the annular channel in Tice's configuration with impinging passages and outlets as suggested by Lorraine in order to aid in forming fuel droplets.

Regarding claims 9 and 10, Tice discloses coplanar ports defined by a body member (see figure 2).

Regarding claims 3, 4, 10 and 11, while Tice shows a unitary nozzle in figure 2, one in the art would appreciate using separate pieces such as a flange member to define the openings at the end of the nozzle. One would be motivated to do so, for example, in order to vary the nozzle orifice sizes for different applications or to allow replacement of worn orifices without having to replace the entire nozzle.

Regarding claim 12, an angle greater then five degrees is disclosed by Vaznaian et al (see figure 1).

Regarding claim 13, Vaznaian et al discloses a threaded region as claimed (col. 3, lines 50-53).

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vaznaian et al (US 4,827,888), Tice (US 1,166,560) and Lorraine (US 5,531,202) as applied to claim 1 above and further in view of Fukushima et al (US 5,492,573). Vaznaian et al

discloses a body member made of aluminum (col. 3, lines 41-42)', applicant claims stainless steel.

Fukushima et al teaches stainless steel for use in fuel injectors to take advantage of the material's corrosion resistance. It would have been obvious at the time the invention was made to use stainless steel in Vaznaian et al as modified in order to take advantage of the corrosion resistant properties as suggested by Fukushima et al.

4. Claims 7-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gauthier et al (US 874,666).

Gauthier et al discloses a nozzle having a body member with an annular bore and a straight bore with a tube concentric with the straight bore with a tube concentric with the straight bore; plurality of radially spaced outlet pods are located around a central outlet port (see figures 1 and 2 & page 1, lines 62-75). As shown in figure 1, the inlet end of the tube is threaded through a coupling member which engages the inlet end of the straight bore (at top of the body in the figure); an additional coupling member is used to connect a gas supply line to the tube. The reference is silent as to a coupling member engaging the inlet end of the angular bore. However, providing a coupling to engage an inlet end of a nozzle is well known and conventional and one in the art would appreciate providing a coupling to attach a supply line to the inlet of the angular bore in Gauthier et al. In addition, one reading Gauthier et al's disclosure would be motivated to use a threaded coupling, similar to that shown attached to the inlet end of the tube in Gauthier et al, in order to allow removal of the nozzle from the gas supply line for replacement, cleaning or repair of the nozzle. It would have been obvious at the time

the invention was made to provide a coupling at the inlet end of the angular bore in Gauthier et al as is conventional in the art and to allow replacement, cleaning or repair of the nozzle.

Regarding claim 8, the ports are substantially coplanar (see figure 1).

Regarding claims 9-1 1, Gauthier et al discloses a mouth-piece that would meet the requirements of claim 10. While the embodiments for the outlet ports of claims 9 and 11 are not disclosed, one in the art would appreciate other equivalent structures such as pods defined in the body member or by the association of a flange/body member are also usable and within the skill of one in the art to employ.

Regarding claim 12, an angle greater then five degrees is disclosed by Gauthier et al (see figure 1).

5. The Examiner has considered the invention claimed a combination of a nozzle and a combustion engine. With reference to claims 4-6, reference is made to "annular disbursement of fuel" (claim 4), "a fuel inlet port", "an oxidizing inlet port" (claim 5) and "a flow path of an oxidizing agent" (claim 6). These passages are considered to be statements of intended use and are not considered by the examiner to be statements of intended use not further limiting the structure of the claimed device.

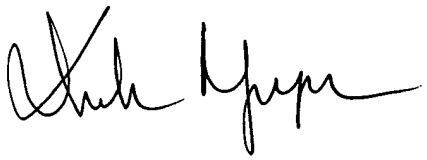
***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to show the art with respect to a fuel injector: Wood et al., and Grant.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dinh Q. Nguyen whose telephone number is 571-272-4907. The examiner can normally be reached on Monday-Thursday 6:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Scherbel can be reached on 571-272-4919. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Dinh Q Nguyen
Primary Examiner
Art Unit 3752

dqn